

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Dustin Johnson on 2/11/2011.

The application has been amended as follows:

Claims:

Claims 1-59 (Cancelled.)

Claim 60 (New) A mass spectrometer pumping device for supplying a diluted sample to a mass spectrometric analyser, comprising:

- a first conduit for a sample;
- a second conduit for a diluent;
- a third conduit for a diluted sample;

a mixer configured to mix the sample from the first conduit with the diluent from the second conduit to form the diluted sample, said mixer being coupled to the first conduit and the second conduit such that the sample enters the mixer through the first conduit at a first flow rate and the diluent enters the mixer through the second conduit at a second flow rate, the mixer being coupled to the third conduit and configured so that said diluted sample exits the mixer into the third conduit at a third flow rate, said third flow rate being substantially equal to the sum of the first and second flow rates;

pump means for pumping fluid through the mixer and the third conduit, the pump means comprising:

- a pump coupled to the third conduit; and

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a valve, or variable constriction, disposed in one of the first and second conduits and configured to control the first or second flow rate respectively; and

a pump controller configured to receive mass spectrometric analyser data indicative of the amount by which the sample is diluted and to control the pump means so that any of the first, second or third flow rates are adjustable with respect to one another in dependence upon the received data to provide a diluted sample with a stable desired dilution factor.

Claim 61 (New) A mass spectrometer pumping device according to claim 60, wherein both the first and second conduits have a respective valve, or variable constriction, disposed therein and configured to control the first and second flow rate respectively.

Claim 62 (New) A mass spectrometer pumping device according to claim 60, wherein the controller is configured to receive the mass spectrometric analyzer data in real time for real time adjustment of the pump means.

Claim 63 (New) A mass spectrometer pumping device according to claim 60, wherein a dilution factor by which the sample is diluted is calculable from the ratio of the first and second flow rates, and the controller is configured to adjust the dilution factor by controlling the pump means.

Claim 64 (New) A mass spectrometer pumping device according to claim 60, wherein either the sample or the diluent contain an internal standard which comprises a predetermined amount of a known substance, and

a dilution factor by which the sample is diluted is calculable by comparing the detected amount of said internal standard by the analyser with the amount of internal standard in the sample or diluent.

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Claim 65 (New) A mass spectrometer pumping device according to claim 60, wherein the pump is configured for substantially constant flow of the diluted sample through the third conduit.

Claim 66 (New) A mass spectrometer pumping device according to claim 65, wherein the controller is configured to adjust the dilution factor by controlling the valve, or variable constriction.

Claim 67 (New) A mass spectrometer pumping device according to claim 63, wherein the pump controller is configured to provide a predetermined, initial dilution factor for the sample, and to increase or reduce the dilution factor to a second dilution factor based on initial analysis data received by the pump controller.

Claim 68 (New) An apparatus comprising:
a mass spectrometer for analysing a sample, and
the mass spectrometer pumping device according to claim 60.

Claim 69 (New) An apparatus according to claim 68, wherein the mass spectrometer for analysing a sample is an inductively coupled plasma mass spectrometer.

Claim 70 (New) A mass spectrometer pumping device for supplying a diluted sample to a mass spectrometric analyser, comprising:
a mixer for mixing a sample with a diluent;
a first conduit for supplying a sample to the mixer at a first flow rate;
a second conduit for supplying a diluent to the mixer at a second flow rate;
a third conduit for receiving a diluted sample from the mixer;
a pump coupled to the third conduit for pumping the diluted sample from the mixer through the third conduit at a third flow rate substantially equal to the sum of the first and second flow rates,

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wherein one of the first and second conduits comprises a valve, or variable constriction, disposed therein for controlling the first or second flow rate, respectively; and

a pump controller configured to receive mass spectrometric analyser data indicative of the amount by which the sample is diluted and to control the pump or valve so that any of the first, second or third flow rates are adjustable with respect to one another in dependence upon the received data to provide a diluted sample with a stable desired dilution factor.

Claim 71 (New) A method of supplying a diluted sample to a mass spectrometric analyser for analysis, comprising:

diluting a sample supplied through a first conduit by mixing said sample with a diluent supplied through a second conduit in a mixer, wherein the step of diluting includes mixing the sample from the first conduit with the diluent from the second conduit to form a diluted sample, said mixer being coupled to the first conduit and the second conduit such that the sample enters the mixer through the first conduit at a first flow rate and the diluent enters the mixer through the second conduit at a second flow rate,

flowing the diluted sample from the mixer through a third conduit coupled to the mixer, the third conduit being configured so that said diluted sample flows from the mixer into the third conduit at a third flow rate, said third flow rate being substantially equal to the sum of the first and second flow rates;

pumping said diluted sample to the analyser from the mixer with a pump coupled to the third conduit, and

controlling the dilution factor by which the sample is diluted by controlling the flow rate of the sample and/or diluent to the mixer using a valve, or a variable constriction, disposed in the first or second conduit to control the first or second flow rate respectively,

wherein the controlling of the dilution factor step is carried out in response to mass spectrometer analyser data received by a pump controller from the analyser

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indicative of the amount by which the sample is diluted and controlling the pump so that any of the first, second or third flow rates are adjustable with respect to one another in dependence upon the received data to provide a diluted sample with a stable desired dilution factor.

Claim 72 (New) A method according to claim 71, wherein the mass spectrometer analyser data is received in substantially real time from the analyser.

Claim 73 (New) A method according to claim 71, further comprising:

disposing an internal standard into the sample, said internal standard comprising a known concentration of a predetermined substance, and

determining the factor by which the sample is diluted by comparing the detected concentration of the internal standard with the known concentration of the internal standard in the undiluted sample.

Claim 74 (New) A method according to claim 73, wherein a second internal standard comprising a known concentration of a second predetermined substance is disposed in the sample and the diluent at the same second concentration levels.

Claim 75 (New) A method according to claim 73, further comprising;

determining the dilution factor from the amount of the first internal standard detected by the mass spectrometer analyser,

determining a correction factor by comparing the determined dilution factor with an expected dilution factor, and

using the correction factor to correct mass spectrometer analyser data.

Claim 76 (New) A method according to claim 71, wherein both the first and second conduits have a respective valve, or variable constriction, disposed therein and the dilution factor is controlled using the first and second valves, or variable constrictions.

Claim 77 (New) A method of supplying a diluted sample to a mass spectrometric analyser for analysis, comprising:

diluting a sample supplied along a first conduit at a first flow rate by mixing said sample with a diluent supplied along a second conduit at a second flow rate in a mixer to form the diluted sample, said mixer being coupled to the first conduit and the second conduit; and

pumping said diluted sample to the analyser with a pump means coupled to the third conduit from the mixer along a third conduit at a third flow rate, said third flow rate being substantially equal to the sum of the first and second flow rates,

wherein the dilution of the sample is controlled using a valve, or variable constriction, disposed in the first or second conduit and configured to control the first or second flow rate respectively; and

receiving mass spectrometer analyser data at a pump controller indicative of the amount by which the sample is diluted and controlling the pump so that any of the first, second or third flow rates are adjustable with respect to one another in dependence upon the received data to provide a diluted sample with a stable desired dilution factor.

Claim 78 (New) A mass spectrometer pumping device according to claim 67, wherein the initial dilution factor is 100.

2. The following is an examiner's statement of reasons for allowance: The closest prior art of record is Nicoli (US 4794806). Nicoli discloses (C7-C18) an automatic sample dilution system comprising: a first conduit for a sample; a second conduit for a diluent; a third conduit for a diluted sample; a mixer arranged to mix the sample from the first conduit with the diluent from the second conduit to form the diluted sample, said mixer being coupled to the first conduit and the second conduit such that the sample

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enters the mixer through the first conduit at a first flow rate and the diluent enters the mixer through the second conduit at a second flow rate, the mixer being coupled to the third conduit; pump means for pumping fluid through the mixer and the third conduit, the pump means comprising a pump coupled to the third conduit; and a valve, or variable constriction, disposed in one of the first and second conduits and arranged to control the first or second flow rate respectively (Fig. 5: 206 or 208); a pump controller arranged to receive dilution analyzer data indicative of the amount by which the sample is diluted and to control the pump means so that any of the first, second or third flow rates are adjustable with respect to one another in dependence upon the received data.

However, the mixer where 1st though 3rd conduit meets, configured with the pump and the valve so that the diluted sample exits the mixer into the third conduit at a third flow rate, said third flow rate being substantially equal to the sum of the first and second flow rates is not rendered obvious over the prior art.

3. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

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4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shogo Sasaki whose telephone number is (571)270-7071. The examiner can normally be reached on Mon-Thur, 10:00am-6:30pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on 571-272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SS

/Jill Warden/
Supervisory Patent Examiner, Art Unit 1773

2/11/11